The SNVT Master List and Programmer's Guide

March 1992

Overview

Echelon Corporation provides a predefined set of Standard Network Variable Types (SNVTs) in order to promote interoperability among LONWORKS™-based products. SNVTs facilitate interoperability by providing a well-defined interface for communication between nodes made by different manufacturers. A node may be installed in a network and logically connected to other nodes via network variables as long as the data types match. A list of all available SNVTs and details of their definitions is provided in the Master SNVT List. For further explanation of SNVTs please refer to the *NEURON® C Programmer's Guide.*

The Master SNVT List

The following list provides information on the definition of all available SNVTs. SNVTs are expressed as either fixed point or floating point numbers, enumeration lists or structures.

The representation for all fixed point numeric SNVTs is as follows:

SNVT Range			Type Definition
0	..	65535	unsigned long
-32768	..	32767	signed long
0	..	255	unsigned short
-128	..	127	signed short

The representation for the floating point SNVTs is ANSI/IEEE 754 floating point: 1 sign bit, 8 exponent bits, and 23 mantissa bits, for a total of 32 bits. For all the floating point SNVTs, the range is approximately -1E38 to +1E38 units. Floating point objects may be declared as local variables and as network variables, and can be communicated across the network.

All available SNVTs are listed in the Master SNVT List. This list will be updated periodically as new SNVTs are added. SNVTs are made available to the NEURON C compiler through the special file snvt.typ. Updates to this file will be made available on the Bulletin Board. All units are Systeme Internationale (SI) except those shown in *italics*.

Measurement	Name	Resolution	Range	SNVT #
Angular velocity	SNVT_angle_vel	0.1 radians/sec	-3,276.8 .. 3,276.7radians/sec	4
	SNVT_angle_vel_f	****	-1E38 .. 1E38 radians/sec	50
Character	SNVT_char_ascii	N/A	0 .. 255	7
Char string	SNVT_str_asc	N/A	see Structures below	36
	SNVT_str_int	N/A	see Structures below	37
Concentration	SNVT_ppm	1 ppm	0 .. 65,535 ppm	29
	SNVT_ppm_f	****	0 .. 1E38 ppm	58
Count, event	SNVT_count	1 count	0 .. 65,535 counts	8
	SNVT_count_f	****	-1E38 .. 1E38 counts	51
Count, incremental	SNVT_count_inc	1 count	-32,768 .. 32,767 counts	9
	SNVT_count_inc_f	****	-1E38 .. 1E38 counts	52
Current	SNVT_amp	0.1 ampere	-3,276.8 .. 3,276.7 amps	1
	SNVT_amp_f	****	-1E38 .. 1E38 amps	48
	SNVT_amp_mil	0.1 milliampere	-3,276.8 .. 3,276.7 milliamps	2
Date	SNVT_date_cal	YYYY,MM,DD	see Structures below	10
Day of week	SNVT_date_day	Enum List	see Enum Lists below	11
Energy, elec	SNVT_elec_kwh	1 KWH	0 .. 65,535 kilowatt-hour	13
	SNVT_elec_whr	0.1 WHR	0 .. 6,553.5 watt-hours	14
	SNVT_elec_whr_f	****	*0 .. 1E38 watt-hour*	68
Energy thermal	*SNVT_btu_f*	****	*-1E38 .. 1E38 btu*	67
	SNVT_btu_kilo	*1 kilo-btu*	*0 .. 65,535 kilobtu*	5
	SNVT_btu_mega	*1 mega-btu*	*0 .. 65,535 mega btu*	6
Flow	SNVT_flow	1 liter/sec	0 .. 65,535 liters/sec	15
	SNVT_flow_f	****	-1E38 .. 1E38 liters/sec	53
	SNVT_flow_mil	1 milliliters/sec	0 .. 65,535 milliliters/sec	16
Installation source	SNVT_config_src	Enum List	see Enum Lists below	69

The master list, continued...

Measurement	Name	Resolution	Range	SNVT #
Length	SNVT_length	0.1 m	0 .. 6,553.5 m	17
	SNVT_length_f	****	-1E38 .. 1E38 m	54
	SNVT_length_kilo	0.1 km	0 .. 6,553.5 km	18
	SNVT_length_micr	0.1 µm	0 .. 6,553.5 µm	19
	SNVT_length_mil	0.1 mm	0 .. 6,553.5 mm	20
Level, continuous	SNVT_lev_cont	.5%	0 .. 100%	21
	SNVT_lev_cont_f	****	0 .. 100%	55
Level, discrete	SNVT_lev_disc	Enum List	see Enum Lists below	22
Mass	SNVT_mass	0.1 g	0 .. 6,553.5 g	23
	SNVT_mass_f	****	0 .. 1E38 g	56
	SNVT_mass_kilo	0.1 kg	0 .. 6,553.5kg	24
	SNVT_mass_mega	0.1 ton	0 .. 6,553.5 metric tons	25
	SNVT_mass_mil	0.1 mg	0 .. 6,553.5 milligrams	26
Phase/rotation	SNVT_angle	0.001 radian	0 .. 65.535 radians	3
	SNVT_angle_f	****	-1E38 .. 1E38 radians	49
Power	SNVT_power	0.1 watt	0 .. 6,553.5 watts	27
	SNVT_power_f	****	-1E38 .. 1E38 watts	57
	SNVT_power_kilo	0.1 kilowatt	0 .. 6,553.5 kilowatts	28
Pressure - gauge	SNVT_press	0.1 kilopascals	-3,276.8 .. 3,276.7kilopascals	30
Pressure - absolute	SNVT_press_f	****	0 .. 1E38 pascals	59
Resistance	SNVT_res	0.1 Ohms	0 .. 6,553.5 Ohms	31
	SNVT_res_f	****	-1E38 .. 1E38 Ohms	60
	SNVT_res_kilo	0.1 kilo-Ohms	0 .. 6,553.5 kilo-Ohms	32
Sound level	SNVT_sound_db	0.01 dB	-327.68 .. 327.67 dBspl	33
	SNVT_sound_db_f	****	-1E38 .. 1E38 dBspl	61
Speed	SNVT_speed	0.1 m/s	0 .. 6,553.5 m/s	34
	SNVT_speed_f	****	-1E38 .. 1E38 m/s	62

The master list, continued...

Measurement	Name	Resolution	Range	SNVT #
	SNVT_speed_mil	0.001 m/s	0 .. 65.535 m/s	35
Temperature	SNVT_temp [1]	0.1 °C	-274 .. 6,279.5 °C	39
	SNVT_temp_f	****	-274 .. 1E38 °C	63
Time of day	SNVT_date_time	HH:MM:SS	see Structures below	12
Time - elapsed	SNVT_time_f	****	-1E38 .. 1E38 sec	64
	SNVT_time_passed	HH:MM:SS:LL	see Structures below	40
Volume	SNVT_vol	0.1 liter	0 .. 6,553.5 liters	41
	SNVT_vol_f	****	0 .. 1E38 liters	65
	SNVT_vol_kilo	0.1 kiloliter	0 .. 6,553.5 kiloliters	42
	SNVT_vol_mil	0.1 milliliter	0 .. 6,553.5 milliliters	43
Voltage	SNVT_volt	0.1 volt	-3,276.8 .. 3,276.7 volts	44
	SNVT_volt_dbmv	0.01 db µv dc	-327.68 .. 327.67 dB µvolts	45
	SNVT_volt_f	****	-1E38 .. 1E38 volts	66
	SNVT_volt_kilo	0.1 kilovolt	-3,276.8 .. 3,276.7 kilovolts	46
	SNVT_volt_mil	0.1 millivolt	-3,276.8 .. 3,276.7 millivolts	47
Phone state	SNVT_telcom	Enum List	see Enum Lists below	38

[1] SNVT_temp represents tenths of a degree Celsius above -274 ^{o}C. To get SNVT_temp units define a constant: `C_to_K` equal to 2740 which is added to temperature expressed in tenths of degrees C.

SNVT Structures

The structure definition used by *SNVT_date_cal* is:

```
typedef struct {
     unsigned long  year;
     unsigned short month;
     unsigned short day;
} SNVT_date_cal;
```

The structure definition used by *SNVT_date_time* is:

```
typedef struct {
     unsigned short hour;
     unsigned short minute;
     unsigned short second;
} SNVT_date_time;
```

The structure definition used by *SNVT_str_asc* is:

```
typedef struct {
     unsigned char  ascii [31];      /* 0...30 chars + NUL
                                        terminator */
} SNVT_str_asc;
```

The structure definition used by *SNVT_str_int* is:

```
typedef struct {
     unsigned short char_set;
     unsigned long  wide_char [15]; /* 0...14 chars + NUL
                                       term. */
} SNVT_str_int;
```

The structure definition used by *SNVT_time_passed* is:

```
typedef struct {
     unsigned short hours;
     unsigned short minutes;
     unsigned short seconds;
     unsigned short milliseconds;
} SNVT_time_passed;
```

Details of the values of the elements of the structures are described in the following table.

Name	Units	Range	Notes
SNVT_date_cal	YYYY,MM,DD		
	year	0-3000	0 represents null date
	month	0-12	0 means month not specified
	day	0-31	0 means day not specified
SNVT_date_time	HH:MM:SS		
	hour	0-23	255 represents null time
	minute	0-59	
	second	0-59	
SNVT_str_asc	ASCII Characters		30 characters
	8 bit chars	30 char	zero-length string plus terminator
	terminator	x'00'	represents null
SNVT_str_int	Int'l Char Set		14 'wide' characters
	char set code	0-255	tbd
	16 bit chars	14 char	zero-length string plus terminator
	terminator	x'0000'	represents null
SNVT_time_passed	HH:MM:SS:LL		
	hours	0 - 254	255 represents null elapsed time
	minutes	0 - 59	
	seconds	0 - 59	
	10 milliseconds	0 - 990	

Enumeration Lists

All SNVTs that are identified as enumeration lists have enum type definition files that can be optionally included. The following declaration must be included in the application code to use the SNVT enum type definition files.

```
#include "typedef file"
```

Details of the enumeration lists are described in the following table.

Name	Enum Definition	Notes
SNVT_config_src		typedef file: SNVT_CFG.H typedef name: config_source
	0 CFG_LOCAL	Node will use self installation functions of NEURON C to set its own address table entries
	1 CFG_EXTERNAL	Node's addressing information will be set by an outside source
	CFG_NUL	0xFF
SNVT_date_day		typedef file: SNVT_DH.H typedef name: days_of_week
	0 DAY_SUN	
	1 DAY_MON	
	2 DAY_TUE	
	3 DAY_WED	
	4 DAY_THU	
	5 DAY_FRI	
	6 DAY_SAT	
	DAY_NUL	0xFF
SNVT_lev_disc		typedef file: SNVT_LEV.H typedef name: discrete_levels

	2-state device	3-state device	4-state device
0 ST_OFF	off	off	off
1 ST_LOW	on	low	low
2 ST_MED	on	high	med
3 ST_HIGH	on	high	high
4 ST_ON	on	high	high
ST_NUL	0xFF		

SNVT_telcom		typedef file: SNVT_TEL.H typedef name: telcom_states
	0 TEL_NOTINUSE	"null state (U0)" not in use
	1 TEL_OFFHOOK	"call initiated (U1)"
	2 TEL_DIALING	"Overlap Sending (U2)"
	3 TEL_DIALCOMP	"Outgoing Call Proceeding (U3)"
	4 TEL_RINGBACK	"Call Delivered (U4)" hearing ringback

The enumeration list, continued...

Name	Enum Definition	Notes
	5 TEL_INCOMING	"Call Present (U6)" incoming call has not yet started ringing (only on ISDN line)
	6 TEL_RINGING	"Call Received (U7)" incoming call when the user has indicated alerting but has not yet answered
	7 TEL_ANSWERED	"Connect Request (U8)" user has answered the call and is waiting to be awarded the call
	9 TEL_TALKING	"Active (U10)" two parties are exchanging data
	10 TEL_HANGINGUP	"Disconnect Request (U11)" user has hung up"
	11 TEL_HUNGUPX	"Disconnect Indication (U12)" the other side hung up
	12 TEL_HOLD	"Suspend Request (U15)" user has requested the network suspend the call
	13 TEL_UNHOLD	"Resume Request (U17)" resume a held call (usually go back to TEL_TALKING)
	14 TEL_RELEASE	"Release Request (U19)" user has requested the network to release
	15 TEL_FULLDUP	"Overlap Receiving (U25)" user has acknowledged the call and is prepared to receive additional information (if any) in overlap mode non-ISDN values
	16 TEL_BLOCKED	connection with blocking, (call waiting disabled)
	17 TEL_CWAIT	call waiting coming in
	18 TEL_DESTBUSY	destination busy
	19 TEL_NETBUSY	problem, network
	20 TEL_ERROR	problem, non-network
	TEL_NUL	(0xFF)

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